

APPENDIX P:

**Proposed Designated Uses, Draft Water Quality Standards and Reservation Water
Resource Information**

KEWEENAW BAY TRIBAL SURFACE WATER QUALITY REGULATIONS

Draft Prepared for
Promulgation by the Environmental Protection Agency

by

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Table of Contents

Authority, Purpose and Applicability of Regulations.....	4
Definitions	6
Designated Uses and Affected Waterbodies.....	14
Outstanding Resource Waters	23
Water Quality Standards and Criteria	25
Description:.....	25
General Criteria:.....	25
Numeric Criteria:	27
Antidegradation Policy, Mixing Zones and Variances	32
Appendix A: Methodologies for the Development of Aquatic Life, Human Health and Wildlife Criteria and Values	36
General Methodology.....	36
Aquatic Life Methodology-pH and Hardness Dependent Criteria.....	3
6	
Human Health Criteria Methodology.....	38
Appendix B: Supporting Documents.....	40



1

Authority, Purpose and Applicability of Regulations

Purpose

The Keweenaw Bay Tribal Water Quality Regulations shall govern water management decisions and activities that affect waters of the Reservation. In addition, these regulations shall serve to recognize, protect and provide for the sacred relationship that exists between the Ojibwa people of the Keweenaw Bay Indian Community and their waters.

These regulations ensure compliance with sections 303 and 518 of the Clean Water Act. These regulations prohibit and regulate unauthorized discharges of substances into the waters of the Reservation and regulates water quality and quantity, and activities that affect water quality, quantity and uses of water of the Reservation.

Intent of Regulations:

The intent of the water quality regulations set forth in this document is to establish water quality requirements applicable to all waters of Reservation. These regulations are intended to protect the public health and welfare, to restore, enhance, and conserve the chemical, physical, and biological integrity of our waters and to protect the natural resources of the Keweenaw Bay Indian Community for present and future generations.

The water quality standards herein represent water quality goals and may not reflect current water quality of all Reservation surface waters. Water quality in certain waters of the Reservation may not meet the water quality standards as a result of natural causes or conditions unrelated to human activities or influence. In cases where waters of the Reservation may have been degraded due to past human activities and influence and attainment of standards in the near future is not economically or technically feasible, these standards shall be used to improve water quality. These standards are the minimum water quality requirements by which the waters of the Reservation are to be managed.

Applicability

These regulations shall apply to all surface waters located within the exterior boundaries of the L'Anse Federal Indian Reservations and all lands held in trust by Keweenaw Bay Indian Community, including waters with reaches flowing through the Reservation, and to all facilities, practices and activities which may affect the quality and quantity of waters of the Reservation located in Baraga, Ontonagon and Marquette counties of Michigan. These standards shall be the primary basis by which all water quality based effluent limits will be established for point sources that effect any waters of the Keweenaw Bay Indian Community.

The water quality standards contained in these regulations are not specifically directed toward off-Reservation waters within the territory claimed or ceded by the Community pursuant to various treaties entered into between Keweenaw Bay Indian Community and the United States.

Severability

Should any provision(s) of these regulations be declared invalid or unconstitutional for any reason, the remainder of these regulations shall not be affected thereby.

Authority

The Keweenaw Bay Indian Community is a federally recognized Indian Tribe exercising inherent sovereign authority over its members and its territories, and has a Reservation created by the 1854 Treaty with the Chippewa, 10 Stat. 1109. The Community is organized pursuant to the provisions of the Indian Reorganization Act of 1934, 48 Stat. 984, 25 U.S.C. § 476. Pursuant to that Act, the Community has adopted a Constitution and Bylaws which were duly approved by the Secretary of the United States Department of the Interior on December 17, 1936. Under the Community's Constitution, all executive and legislative powers are vested in a twelve-member Tribal Council. Article VI, Section 1(a) of the Constitution empowers the Tribal Council "to protect and preserve the tribal property, wildlife and natural resources of the Community." In addition, Article VI, Section 1 (n) of the Constitution empowers the Tribal Council "to promulgate and enforce ordinances which are intended to safeguard and promote the peace, safety, morals, and general welfare of the Keweenaw Bay Indian Community by regulating the conduct of trade and the use and disposition of property upon the Reservation."

2

Definitions

Terms defined as used in document

Acute: A stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96 hours or less is typically considered acute. When referring to aquatic toxicology or human health, an acute affect is not always measured in terms of lethality.

Adverse Effect: Any deleterious effect to organisms due to exposure to a substance. This includes effects which are or may become debilitating, harmful, or toxic to the normal functions of the organism, but does not include non-harmful effects such as tissue discoloration alone or the induction of enzymes involved in the metabolism of the substance.

Ambient: The background physical, chemical, and biological conditions or characteristics of waters including the course in which it flows and the normal background daily and seasonal variations in weather, climatic, and atmospheric conditions that affect a given waterbody. It includes the levels of pollutants present in ambient water that are not from anthropogenic input sources.

Agricultural and/or Industrial Use: Refer to Chapter 3, herein.

Anthropogenic: Caused by or related to human actions either directly or indirectly.

Antidegradation Policy: This policy is used to protect existing uses and consists of approved antidegradation statements consistent with 40 CFR 131.12 and allow the permitting authority and the Community to determine on a case-by-case basis whether, and to what extent, water quality may be lowered.

Aquatic Community: Refers to any and all animal, plant or other life form which resides during any stage of its life cycle within a waterbody.

Background: The ambient environmental condition.

Bioaccumulation: The process by which contaminants (pollutants) build up over time within the tissues of an organism as a result of uptake from any and all environmental sources. This process is particularly associated with persistent organic contaminants that generally tend to be lipophilic and are not easily metabolized or excreted.

Bioaccumulation Factor (BAF): the ratio liters per kilogram (L/Kg) of a substance's concentration in tissue of an aquatic organism to its concentration in the ambient water, where both the organism and its food are exposed and the ratio does not change substantially over time.

Bioaccumulative Chemical of Concern (BCC): A chemical which upon entering the surface water, by itself or as its toxic transformation product, accumulates in aquatic organisms. Generally, chemicals with

a half-life in the water of less than eight weeks are not BCCs. BCCs listed in 40 CFR 132, table 6A (pg. 15393), as amended, will comprise the definition of all the chemicals identified herein as BCCs.

Bioconcentration: The process by which chemicals become concentrated in the tissues of fish and aquatic invertebrates via direct partitioning across the gills or epithelial tissue.

Biota-sediment accumulation factor (BSAF): The ratio (in kilogram of organic carbon/kilogram of lipid) of a substance's lipid-normalized concentration in tissue of an aquatic organism to its organic carbon-normalized concentration in surface sediment in situations where: 1) the ratio does not change substantially over time, 2) both the organism and its food are exposed, and 3) the surface sediment is representative of average sediment in the vicinity of the organism.

Biological integrity: The ambient biological condition of waters. It includes daily and seasonal variations in the biological condition of a given water and excludes any conditions that are related to human activities or influence.

Carcinogen : A substance which causes an increased incidence of benign or malignant neoplasms in animals or humans, or substantially decreases the time to develop neoplasms.

Carcinogenicity: The ability of a toxicant to cause cancer. Any chemical that significantly increases the risk of any type of cancer is classified as carcinogenic.

Ceremonial, Religious, and Spiritual Uses: Refer to designated uses, chapter 4, herein.

Chemical Integrity: The ambient chemical characteristics of waters. It includes the normal daily and seasonal variations in the chemical constituents and parameters of natural waters and the levels of pollutants present in water that are not from anthropogenic sources.

Chemical of Concern: EPA 'priority list' of pollutants consisting of compounds and families of compounds that are among the most persistent, prevalent, and toxic of chemicals known to man. This list shall be defined herein as the current list consisting of the toxic pollutants identified in 40 CFR 132.6 Table 6, p. 15393, as amended.

Chronic: A stimulus that continues for a relatively long period of time. The term long is considered a relative term which depends on the life span of an organism. The measurement of a chronic effect can be, but is not limited to, reduced growth, reduced reproduction, etc. in addition to lethality.

Chronic Toxicity: The capacity of a chemical to cause adverse effects only after repeated or continuous exposure over an extended period of time.

Cold Water Fishery Use (CW): Refer to designated uses, chapter 4, herein.

The Community: Refers to the Keweenaw Bay Indian Community, a sovereign and federally recognized Indian Tribe of the L'Anse Federal Indian Reservation.

Control Document: Any authorization issued by the appropriate permitting authority to any source of pollutants to waters under its jurisdiction and which specifies conditions under which the source is allowed to operate.

Congener: Refers to a group of compounds that vary in the number of substituents and/or the configuration of these substituents, but share a basic chemical structure.

Contaminant: A harmful chemical or biological substance which can be incorporated into, onto, or be ingested by aquatic organisms, consumers of aquatic organisms, or users of the aquatic environment; or an anthropogenic input that alters any physical, biological or chemical property of the water.

Criteria: Element of the Community's water quality standards, expressed as constituent concentrations or levels, or as a narrative statements, representing a quality of water that supports a particular use.

Critical Habitat: A specific geographic area occupied by a species that is listed in accordance with the provisions of section 4 of the Endangered Species Act, on which are found those physical or biological features essential to the conservation of the species and which may require special management consideration or protection.

Cultural Use: Refer to designated uses, chapter 4, herein.

CWA: refers to the Clean Water Act.

Degradation: Lowering of the existing quality or desired quantity of the waters of the Reservation including, but not limited to, the chemical, physical, and biological characteristics and values associated with waters of the Reservation. Undesirable changes in the beds and banks of waters of the Reservation including, but not limited to, objectionable deposits, changes in the shore lands, changes in wetland vegetation, local ecology, bank stability, shall constitute degradation.

Designated Uses: Those uses specified in water quality standards for each waterbody or segment whether or not such uses are being attained.

Design Flow: The design flow shall be equal to the most restrictive of the twelve (12) monthly 95% exceedence flows, except where the Tribal Council determines that a more restrictive design flow is necessary or where the Tribal Council determines that seasonal design flows may be granted. The 95% exceedence flow is the flow equal to or exceeded 95% of the time for any given or specified month.

Discharge(s): Any addition of any pollutant or combination of pollutants to water. Industrial discharge (s) that meet with background conditions shall constitute a discharge; i.e. any addition of any wastewater or pollutant, even though this discharge water meets with background conditions, is considered a discharge.

Discharger(s): Any person, business, legal entity, or other party who engages in activities resulting in a discharge into waters of the Reservation.

Dissolved Oxygen: The amount of oxygen dissolved in water.

Dissolved Solids: Refers to the amount of materials dissolved in water and is commonly expressed as a concentration in terms of milligrams per liter (mg/L).

DOC: Concentration of dissolved organic carbon expressed as kilograms dissolved organic carbon per liter of water.

Drainage Basin: A waterbody and the land area drained by it.

Effluent: Refers to a wastewater discharge from a point source to the waters of the Keweenaw Bay Indian Community or connecting waters.

Effluent limitations: Any restriction imposed by the Keweenaw Bay Indian Community, EPA, and/or other federal entity, on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into water.

EPA: Refers to the United States Environmental Protection Agency.

Existing Uses: Those uses actually attained by Ojibwa peoples in a waterbody on or after November 28, 1975, whether or not they are included in the water quality standards.

Final Acute Value: A calculated estimate of the concentration of a test material such that 95 percent of the genera have higher Genus Mean Acute Values (GMAVs), as derived from studies where acceptable acute toxicity tests have been conducted with the test material. In cases where the Species Mean Acute Value (SMAV) of a commercially important or critical species is lower than the calculated FAV, then the SMAV will replace the calculated FAV in order to provide protection for that important species.

Food Web: Referring to the interdependent feeding relationships between organisms within a given ecosystem, including, but not limited to, such strategies as herbivorism, carnivorism, parasitism, and symbiotic relationships.

Great Lakes System: All the streams, rivers, lakes and other waterbodies within the drainage basin of the Great Lakes within the United States.

Habitat: The natural locality or geographical range of individuals and/or populations of living organisms. Includes the surrounding living and nonliving ecosystem, e.g. food, cover, and other basic requirements for support and propagation of individuals and populations.

Hydric: Water saturated.

Hypolimnion: If a lake is deep enough, the water stratifies in to layers created by the differing temperature of the water which alters its density. The upper warm, lighter layer is referred to as the epilimnion. The cool dense layer is referred to as the hypolimnion. The transitional layer between the epilimnion and the hypolimnion is referred to as the thermocline or metalimnion.

Impact: A change in the chemical, physical, or biological quality or condition of a waterbody caused by external sources.

Impair: A detrimental effect on the biological integrity of a waterbody caused by an impact that prevents attainment of the designated use.

Industrial: Refers to an organized business or enterprise and the activities which often produce or emit discharges, emissions, or waste and/or byproducts associated with its existence.

Keweenaw Bay Indian Community: The Keweenaw Bay Indian Community is a federally recognized Indian Tribe.

K_{ow}: Octanol-water partition coefficient of a chemical.

L'Anse Federal Indian Reservation: All land reserved for use and occupied by the Keweenaw Bay Indian Community established by the treaty of 1854. A map of the established exterior boundaries of the L'Anse Indian Reservation can be found in Appendix B.

Littoral Zone: The area of a waterbody that extends from the shore to just above the influence of waves and spray. This zone is characterized in part by the presence of macrophytes and aufwuchs. Aufwuchs refers to the whole community of microscopic organisms such as algae, bacteria, fungi, protozoa and small metazoa which are attached to firm substrates such as rocks.

Lipophilic: Substances that are more soluble in lipid/fatty substances.

Loading: The addition of a substance to a waterbody; the concentration of a substance within a discharge multiplied by the flow of the discharge over a specified time expressed as concentration per unit time.

Loading Capacity: The loading capacity is the greatest amount of loading that a water can receive without violating water quality standards.

macrophyte(s): Refers to the large (macroscopic) plants found in surface waters.

Metabolite: A substance that is the product of biological changes to a chemical.

Micrograms per Liter (ug/l): Equivalent to 10^{-9} kilograms per liter; may also be referred to as parts per billion (ppb).

Milligrams per liter (mg/l): Equivalent to 10^{-6} kilograms per liter; may also be referred to as parts per million (ppm).

Mixing Zone: The portion of a waterbody designated by the Community where a point source or venting groundwater discharge is mixed with the surface waters of the Reservation and certain chronic water quality criteria conditions may be exceeded but acute conditions are prevented. Also, see Chapter 7, herein.

Monitoring: A scientifically designed system of standardized measurements and observations which are used in the ongoing evaluation of a given ecosystem.

Natural Resources Department: The Natural Resources Department of the Keweenaw Bay Indian Community. This department was created by Tribal Council to manage all natural resources within the Reservation.

Navigable Waters Use: Refer to designated uses, chapter 4, herein.

Nonpoint Source Pollution: Pollution sources that are diffuse and do not have a single point of origin and are introduced into a receiving stream or other body of water, from a nonspecific outlet. The pollutants are generally carried by runoff, including urban runoff. This term includes other sources of pollution that generally can not be classified as point sources of pollution. Common sources include agriculture, urban areas, certain industrial activities, construction sites, land disposal, dams and other hydrologic and hydraulic modifications.

Numeric Criteria: Criteria expressed as a concentration of chemicals in water or properties of water that serves to protect a designated use.

OKRW: see Outstanding Keweenaw Bay Indian Community Resource, page 25 and 34-35.

ONRW: see Outstanding National Resource Water, page 24 and 34-35.

Organoleptic Effects: Non-toxicity based criteria for taste and odor which make water and edible aquatic life unpalatable but nontoxic to humans.

Permit: A legal authorization or license which regulates activity within the L'Anse Reservation and is issued by the Community or other appropriate permitting authority.

Permitting Authority: Regulatory authority relative to issuance of permits pursuant to the CWA lies with the Environmental Protection Agency, until such time as permitting authority maybe delegated by the EPA to the Keweenaw Bay Indian Community .

pH: The negative logarithm of the hydrogen ion activity concentrations expressed as moles per liter, the mathematical expression being: $\text{pH} = -\log \{H^+\}$.

Physical Integrity: The ambient physical condition of a water as it related to the beds and banks of waters, bank stability and sedimentation. It includes the daily and seasonal variations in the physical conditions unrelated to human activities and influence.

Plume: The visible or measurable discharge of a contaminant from a given point of origin.

POC: Concentration of particulate organic carbon expressed as kilogram of particulate organic carbon per liter of water.

Point Source: Any discernable, confined and discrete conveyance from which wastewater is or may be discharged to the waters of the Reservation and may include, but is not limited to, a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other watercraft from which pollutants are or may be discharged.

Pollutant: Refer to the definition of contaminant.

Pollution: Generally, the presence of matter or energy whose nature, location, or quantity produces undesired environmental effects; Under the Clean Water Act, the term is defined as the man-made or man-induced alteration of the physical, biological, and radiological integrity of the water.

Promulgation: The process of drafting, receiving comments, and publishing rules that have the same effect as laws.

Raw Water: refers to waters of the Reservation before treatment.

Receiving Waters: means the waters or watercourse of the Reservation into which an effluent is or may be discharged.

Recreational Use: Refer to designated uses, chapter 4, herein.

The Reservation: Refers to the L'Anse Federal Indian Reservation. Maps of the established exterior boundaries of the L'Anse Indian Reservation can be found in Appendix B.

Riparian Habitat or Zone: An area adjacent to and along a waterbody that often is vegetated and that constitutes a buffer zone between the nearby lands and the water.

Runoff: That part of precipitation, snow melt, or irrigation water that drains off land, in sheet flow, in rivulets, or in defined watercourses, into surface water. This water can carry sediments and pollutants into receiving waters.

Secondary Contact: Activities in which a person's water contact would be limited to the extent that bacterial infections of eyes, ears, respiratory or digestive systems, or urogenital areas would normally be avoided.

Sediment: Soil, sand, gravel, organic matter and minerals which are washed from land into surface water and are eventually deposited upon the bed or bottom of a waterbody.

Sewage: The waste and wastewater discharged into sewers from homes and industry.

Spawning Habitat: Regions and areas within a waterbody including, but not limited to, riffles, beds, backwaters, littoral zones, and wetlands, where fish concentrate breeding activities and eggs are hatched.

Teratogenic: Causing an effect such as developmental malformations.

Thermocline: If a lake is deep enough, the water stratifies in to layers created by the differing temperature of the water which alters its density. The upper warm, lighter layer is referred to as the epilimnion. The cool dense layer is referred to as the hypolimnion. The transitional layer between the epilimnion and the hypolimnion is referred to as the thermocline or metalimnion.

Total Hardness: The total concentration of calcium and magnesium ion expressed as milligrams of calcium carbonate (CaCO_3) per liter.

Toxicant: Refer to the definition of contaminant.

Toxic Substance: A substance, except for heat, that is present in sufficient concentration or quantity that results in harm to plant life, animal life or designated uses.

Tribal Council: Twelve members of an elected governing body of the Keweenaw Bay Indian Community. This body is empowered with authority and jurisdiction over the Keweenaw Bay Indian Community which is dictated by the Constitution and Bylaws of the Keweenaw Bay Indian Community.

Tributary: A river, stream, or creek inlet flowing into a larger waterbody.

Trophic Level: This refers to the arrangement of producer and consumer aquatic organisms into hierarchical feeding levels. These levels are based on the role of an organism within the food web. Each individual level is referred to as a trophic level and is assigned a number.

Turbidity: The presence of organic and/or inorganic particulate matter and/or planktonic organisms in water which results in decreased water clarity causing it to appear unclear, discolored, murky, or opaque.

Uptake: the acquisition of a substance from the environment by an organism as a result of any active or passive process.

Urban runoff: Storm water from city streets and adjacent domestic or commercial properties, construction and other surface disturbance sites, parking lots and other impermeable surfaces. It is one of the means by which terrestrial pollutants are conveyed to receiving waters.

Variance: A temporary exemption from any water quality for specific pollutants granted to an individual entity, corporation, or business.

Warm Water Fishery Use: refer to designated uses, chapter 4, herein.

Wastewater: The liquid waste resulting from commercial, institutional, domestic, industrial, and agricultural activities, also including cooling and condensing waters, sanitary sewage, stormwater run off, and industrial waste.

Water Column: The pelagic/open water in a body of water that is measured from the surface to the bottom sediments.

Water Quality: The chemical, biological, and physical integrity of a body of water.

Water Quality Standard (WQS): The water quality goals of a waterbody, the designated use or uses for that body of water and criteria necessary to protect those uses. Standards can either be State regulations or laws, Federal Regulations, or Water Quality Standards adopted by an authorized Indian Tribe.

Waters of the Reservation: Such accumulations of water, surface and/or underground, natural or artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon the L'Anse Reservation and all lands held in trust by Keweenaw Bay Indian Community. The term does not include any pond, reservoir or facility built for reduction or control of pollution or cooling of water prior to discharge unless the discharge therefrom causes or threatens to cause water pollution. This definition includes, but is not limited to; inland lakes, rivers, streams, creeks, impoundments, and open drains and all other surface waterbodies of water within the boundaries of the Reservation.

Watershed: A watershed is a drainage area or basin in which all land and water areas drain or flow toward a centralized site of collection such as a river, stream, or lake.

Wetlands or Wetland Ecosystems: Transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water; those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in hydric soil conditions. Wetlands generally include swamps, marshes, bogs, muskegs, fens and similar areas.

Whole Effluent: The total effect of an effluent measured directly with a toxicity test.

Wild Rice: *Zizania Palustris aquatica*. A tall, aquatic grass which produces an edible grain and is native to the regional areas of Canada and the northern United States. The harvesting, propagation and protection of wild rice is of significant cultural value to the Keweenaw Bay Indian Community.

Wildlife Use: See Designated Uses Chapter 4, herein.

3

Designated Uses and Affected Waterbodies

Designated Uses:

The following are the designated uses which apply to all surface waters of the Keweenaw Bay Indian Community:

Cold Water Fishery (CW): Waterbodies containing aquatic communities that thrive in relatively cold water or areas which serve as spawning or nursery habitat or areas of overwintering for any cold water fish species. Typical coldwater fish species includes:

- i) Trout
- ii) Salmon
- iii) Whitefish
- iv) Cisco (commonly known as the herring)

Warm Water Fishery (WW): Waterbodies containing aquatic communities that thrive in relatively warm water or serve as spawning or nursery habitat for warm water fish species. Typical warm water fish species include:

- i) Bass
- ii) Pike
- iii) Walleye

Wetland (T): Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in hydric soils. Wetlands include, but are not limited to, swamps, marshes, bogs, fens and muskegs.

Wildlife Use (W): Any waters that are capable of providing a water supply, riparian habitat and/or provides for a major dietary food source for the support and propagation of indigenous terrestrial or aquatic wildlife within the Reservation.

Recreational Use: Primary Contact (R¹): The recreational use of any waterbody which involves prolonged direct contact with water to the point of complete submersion and involves the risk of incidental ingestion of water in quantities sufficient to pose a potential health risk. These uses include swimming, water-skiing, surfing, skin/scuba diving, or any other activity which will most likely lead to immersion of the head into the said waterbody. Secondary Contact (R²): The recreational use of any waterbody where direct contact may but need not occur and does not normally involve immersion including the head nor the incidental ingestion of water. These uses include boating, fishing, sailing, hiking, wading, or any other activity which would not likely lead to complete immersion into the said waterbody.

Ceremonial, Religious, or Spiritual Use (S): To protect and provide for the sacred relationship that exists between the Ojibwa people of Keweenaw Bay Indian Community and their waters, this use includes, but is not limited to, any ceremonial use of water, water-borne based religious practice or spiritual belief of a waterbody. This use also provides for ceremonies and other activities such as, but

not limited to, the Sturgeon Feast, the "Breaking of the Water" ceremony, and any religious prayers or blessings practiced by the people of the Keweenaw Bay Indian Community.

Cultural Uses (C): Waters which are suitable or potentially suitable for cultural, historical or heritage uses by the Ojibwa people of the Keweenaw Bay Indian Community. This includes practices such as, but not limited to, the growing and subsequent harvest of wild rice, harvesting of any aquatic/riparian flora or fauna for medicinal purposes, taking of water for use in traditional ceremonial healing practices and historical feasts.

Navigational Use (N): Applies to all navigable waters. Includes any waterway that has been used, or is susceptible for use by itself or in connection with other waterways, for the transportation of cargo, crew, or use as a highway of commerce.

Public Drinking Water Supply Use (P): Any raw surface water source that, after conventional treatment, provides as a source of safe water for various uses, including but not limited to, human consumption, cooking, food processing, and in food preparation or as an ingredient in foods and beverages for Reservation and lands held in trust by Keweenaw Bay Indian Community.

Agricultural and/or Industrial Use (A): Use of water for agricultural purposes including irrigation of crops, livestock watering, grazing, farming, ranching, and the support of vegetation. Also, the use of water for industrial cooling and processing purposes.

Affected Waters and Associated Designated Uses

The Streams, Creeks, and Lakes listed on the following pages are those affected by Surface Water Quality Standards of the Keweenaw Bay Indian Community. As more than one designated use applies to a given waterbody, the most restrictive water quality standards for one or more of those designated uses shall apply to that waterbody:

LAKE/STREAM/ CREEK NAME	Designated Uses										LOCATION
	C W	W W	T	W	R	S	C	N	P	A	
Bella Lake Creek	Y		Y	Y	R ₂	Y	Y			Y	51N 32W 25
Bishop Lake		Y		Y	R ₁	Y	Y	Y			50N 33W 1350N 33W 24
Camp Creek	Y			Y	R ₂	Y	Y			Y	51N 32W 25 51N 32W 36
Dakota Creek	Y		Y	Y	R ₂	Y	Y			Y	51N 32W 26 51N 32W 25 51N 32W 27 51N 32W 35 51N 32W 36
Daults Creek	Y		Y	Y	R ₂	Y	Y			Y	50N 33W 27 50N 33W 22 50N 33W 34

											50N 33W 35
Dead Man's Creek	Y		Y	Y	R ²	Y	Y				51N 33W 10 51N 33W 15 51N 33W 16 51N 33W 17 51N 33W 21
Denomie Creek	Y		Y	Y	R ²	Y	Y				50N 33W 22 50N 33W 23 50N 33W 25 50N 33W 36
Gomanche Creek and its tributaries	Y		Y	Y	R ²	Y	Y			Y	50N 33W 13 50N 33W 12 50N 32W 07 50N 32W 06 50N 33W 19 50N 33W 24 50N 33W 30
LAKE/STREAM/ CREEK NAMES:	Designated Uses										LOCATION:
	C W	W W	T	W	R	S	C	N	P	A	
Kallio Creek	Y			Y	R ²	Y	Y				51N 32W 14 51N 32W 15 51N 32W 21 51N 32W 22 51N 32W 23
Kelsey Creek	Y			Y	R ²	Y	Y				51N 33W 0751N 33W 12 51N 33W 18
Laughs/Laws/Lost Lake		Y		Y	R ¹	Y	Y	Y			50N 32W 18
Linden Creek	Y			Y	R ²	Y	Y			Y	50N 33W 03 50N 33W 02 50N 33W 01 50N 33W 12 50N 33W 11 50N 33W 10 50N 33W 14
Little Carp River	Y		Y	Y	R ²	Y	Y				51N 33W 19 51N 33W 30 51N 33W 20 51N 33W 18 51N 33W 17

											51N 33W 16 51N 33W 09 51N 33W 10 51N 33W 07 51N 33W 08 51N 33W 31
Little Silver Creek	Y		Y	Y	R ²	Y	Y				51N 32W 16 51N 32W 18 51N 32W 17 51N 32W 20 51N 32W 21 51N 32W 15 51N 32W 10

LAKE/STREAM/ CREEK NAMES:	Designated Uses										LOCATION:
	C W	W W	T	W	R	S	C	N	P	A	
Meadow Creek	Y		Y	Y	R ²	Y	Y			Y	51N 32W 31 51N 32W 29 51N 32W 30 51N 32W 32 51N 33W 3650N 33W 03
Mud Lakes and Sloughs		Y	Y	Y	R ²	Y	Y	Y			51N 33W 15
Mud Lake Creek	Y		Y	Y	R ²	Y	Y			Y	51N 33W 10 51N 33W 15 51N 33W 16 51N 33W 20 51N 33W 21
Page(s) Creek	Y		Y	Y	R ²	Y	Y			Y	50N 32W 06 50N 32W 05 50N 32W 08 50N 32W 09 50N 32W 17
Pekkala Creek	Y		Y	Y	R ²	Y	Y			Y	50N 33W 22 50N 33W 27

										50N 33W 26 50N 33W 35
Pequaming coastal sloughs and wetland	Y		Y	Y	R ²	Y	Y	Y		51N 32W 04 51N 32W 09
Pinery Lakes		Y	Y	Y	R ¹	Y	Y	Y	Y	51N 32W 32 50N 33W 02
Robillard Creek	Y		Y	Y	R ²	Y	Y			50N 33W 14 50N 33W 15 50N 33W 23 50N 33W 24 50N 33W 13 50N 33W 25 50N 33W 30
Sand Point Sloughs	Y		Y	Y	R ¹	Y	Y	Y	Y	51N 33W 23 51N 33W 26 51N 33W 27

LAKE/STREAM /CREEK NAMES:	Designated Uses										LOCATION
	C W	W W	T	W	R	S	C	N	P	A	
Silver River and its tributaries	Y		Y	Y	R ¹	Y	Y	Y		Y	50N 32W 06 50N 32W 07 50N 32W 18 50N 32W 17 50N 32W 16 50N 32W 21 50N 32W 28 50N 32W 20 50N 32W 29 50N 32W 32 50N 32W 33 51N 32W 34 51N 32W 35 51N 32W 27 51N 32W 28 51N 32W 26

											51N 32W 23 51N 32W 24 51N 32W 13 51N 31W 18 51N 32W 33
Third Lake (including its inlet creek)		Y	Y	Y	R ¹	Y	Y	Y		Y	51N 32W 33
Unlabeled #1 Creek into Huron Bay	Y		Y	Y	R ²	Y	Y				51N 31W 05 51N 31W 06 51N 32W 01 51N 32W 12
Unlabeled #2 Creek into Huron Bay	Y		Y	Y	R ²	Y	Y				51N 31W 07 51N 32W 11 51N 32W 12

LAKE/STREAM /CREEK NAMES:	Designated Uses										LOCATION:
	C W	W W	T	W	R	S	C	N	P	A	
Unlabeled #3 Creek into Huron Bay	Y		Y	Y	R ²	Y	Y				51N 31W 07 51N 32W 12
Unlabeled #4 Creek into Sand Bay	Y		Y	Y	R ²	Y	Y				51N 31W 01 51N 31W 02 51N 31W 11
Unlabeled #5 Lake	Y		Y	Y	R ²	Y	Y				51N 32W 32

Unlabeled #6 Lake	Y		Y	Y	R ²	Y	Y				51N 32W 04
Unlabeled #7 Lake	Y		Y	Y	R ²	Y	Y				51N 32W 09
Unlabeled #8 Lake	Y		Y	Y	R ²	Y	Y				51N 32W 21
Unlabeled #9 Lake	Y		Y	Y	R ²	Y	Y				51N 32W 36
Unlabeled #10 Lake	Y		Y	Y	R ²	Y	Y				51N 32W 24
Unlabeled #11 Lake	Y		Y	Y	R ²	Y	Y				51N 32W 13
Unlabeled #12 Lake	Y		Y	Y	R ²	Y	Y				51N 33W 33
Unlabeled #13 Lake	Y		Y	Y	R ²	Y	Y				51N 33W 31
Unlabeled #14 Lake	Y		Y	Y	R ²	Y	Y				51N 33W 30
Unlabeled #15 Lake	Y		Y	Y	R ²	Y	Y				51N 33W 19
Unlabeled #16 Lake	Y		Y	Y	R ²	Y	Y				51N 33W 05

Unlabeled #17 Lake	Y		Y	Y	R ²	Y	Y				50N 32W 31
Unlabeled #18 Lake	Y		Y	Y	R ²	Y	Y				50N 32W 30

LAKE/STREAM/ CREEK NAMES:	Designated Uses										LOCATION:
	C W	W W	T	W	R	S	C	N	P	A	
Unlabeled #20	Y		Y	Y	R ²	Y	Y				50N 32W 06

Lake											
Unlabeled #21	Y		Y	Y	R ²	Y	Y				50N 33W 15
Unlabeled #22	Y		Y	Y	R ²	Y	Y				50N 33W 23
Unlabeled #23	Y		Y	Y	R ²	Y	Y				50N 33W 27
Unlabeled #24 Creek into wetland area	Y		Y	Y	R ²	Y	Y				51N 33W 28 51N 33W 29
Unlabeled #25 Creek into disposal ponds	Y		Y	Y	R ²	Y				Y	51N 33W 32 51N 33W 31
Unlabeled #26 Creek from Unlabeled lake owned by the DNR	Y		Y	Y	R ²	Y	Y				51N 33W 05 51N 33W 07 51N 33W 08
Unlabeled #27 Creeks into Pequaming Bay	Y		Y	Y	R ²	Y	Y				51N 32W 04 51N 32W 08 51N 32W 09 51N 32W 17 51N 32W 16 51N 32W 18 51N 32W 19
Unlabeled #28 Creek into Keweenaw Bay	Y		Y	Y	R ²	Y	Y				51N 33W 31 51N 33W 32 51N 33W 33
Unlabeled #29 Series of creeks from Aura Rd. into wetland areas	Y		Y	Y		Y	Y				51N 32W 02 51N 32W 11
Unlabeled #30 Series of creeks into unlabeled lake #6	Y		Y	Y	R ²	Y	Y				51N 32W 04 51N 32W 10

LOCATION:

LAKE/STREAM/ CREEK NAMES:	Designated Uses										
	C W	W W	T	W	R	S	C	N	P	A	
Unlabeled #31 creek into Huron Bay	Y		Y	Y	R ²	Y	Y				51N 32W 01 51N 32W 06
Unlabeled #32 creek into wetland	Y		Y	Y	R ²	Y	Y				51N 33W 22
West Sleeping River and its Tributaries	Y		Y	Y	R ²	Y	Y			Y	53N 38W 28 53N 38W 27 53N 38W 22 53N 38W 23 53N 38W 14
Holland Creek and its Tributaries	Y		Y	Y	R ²	Y	Y			Y	53N 38W 26 53N 38W 23
East Sleeping River and its Tributaries	Y		Y	Y	R ²	Y	Y			Y	53N 38W 23 53N 38W 14

4

Outstanding Resource Waters

Outstanding National Resource Waters

The following waterbodies have been designated as Outstanding National Resource Waters (ONRW) by the Keweenaw Bay Indian Community:

Waterbody	Location		Waterbody	Location
Silver River and its tributaries	50N 32W 06		Sand Point Sloughs	51N 33W 23 51N 33W 26 51N 33W 27
	50N 32W 07			
	50N 32W 18			
	50N 32W 17			
	50N 32W 16			
	50N 32W 21			
	50N 32W 28			
	50N 32W 20			
	50N 32W 29			
	50N 32W 32			
	50N 32W 33			
	51N 32W 34			
	51N 32W 35			
	51N 32W 27			
	51N 32W 28			
	51N 32W 26			
	51N 32W 23			
	51N 32W 24			
	51N 32W 13			
	51N 31W 18			
	51N 32W 33			
Little Carp River	51N 33W 19		Pinery Lakes	51N 32W 32 50N 33W 02
	51N 33W 30			
	51N 33W 20			
	51N 33W 18			
	51N 33W 17			
	51N 33W 16			
	51N 33W 09			
	51N 33W 10			
	51N 33W 07			

	51N 33W 08 51N 33W 31		
Waterbody	Location	Waterbody	Location
Mud Lakes and Sloughs	51N 33W 10 51N 33W 15 51N 33W 16 51N 33W 20 51N 33W 21	Denomie Creek	50N 33W 22 50N 33W 26 50N 33W 23 50N 33W 25 50N 33W 36 50N 32W 31
Unlabeled #1 Creek into Huron Bay	51N 31W 05 51N 31W 06 51N 32W 01 51N 32W 12	Unlabeled #2 Creek into Huron Bay	51N 31W 07 51N 32W 11 51N 32W 12
Daults Creek	50N 33W 27 50N 33W 22 50N 33W 26 50N 33W 34 50N 33W 35	Pequaming Bay coastal wetland	51N 32W 04 51N 32W 05

Outstanding Keweenaw Bay Indian Community Resource Waters

All waters, including any portion flowing through or adjacent to, within the exterior boundaries the Reservation and on all lands held in trust by Keweenaw Bay Indian Community, shall be designated as Outstanding Keweenaw Bay Indian Community Resource Waters (OKRW) if not designated as an ONRW. For waters designated as OKRWs, all new discharges of any Bioaccumulative Chemical of Concern (BCC) as defined in 40CFR132, Table 6, as amended, will be prohibited. New or expanded discharges of any Chemical of Concern shall be subject to all applicable provisions in the antidegradation policy of these regulations.

5

Water Quality Standards and Criteria

Description:

To preserve and enhance the quality of the waters of the Reservation and to protect designated and existing uses, the following standards of water quality are established. These standards are established to govern water management decisions within the drainage basins that affect waters of the Reservation. To every extent practical and possible, the following general water quality criteria shall apply to all waters of the Reservation. In instances where more stringent standards for designated waterbodies are set, the stricter numerical standards supersede the general standards.

These standards may not reflect current water quality in all cases. Water quality of certain waters of the Reservation may not meet standards as a result of natural causes or conditions unrelated to human influence. Where waters of the Reservation may have been degraded due to past human activities and attainment of standards in the near future is not economically or technically achievable, these standards shall be used to improve water quality. These standards are the minimum water quality requirements by which the waters of the Reservation are to be managed.

The water quality standards established herein are the minimally acceptable water quality conditions. Water quality shall be equal to or better than these minimal water quality conditions not less than ninety-five (95) percent of the time. Water quality standards shall apply at all flows equal to or exceeding the design flow. The subsequent design flow must be used unless data exists to demonstrate that an alternate design flow is more appropriate. The design flow shall be equal to the most restrictive of the twelve (12) monthly 95% exceedence flows, except where the Tribal Council determines that a more restrictive design flow is necessary or where the Tribal Council determines that seasonal design flows may be granted. The 95% exceedence flow is the flow equal to or exceeded 95% of the time for any given or specified month.

General Standards:

I. Physical Characteristics: The waters of the Reservation shall not have any of the following unnatural physical properties in quantities which are or may become injurious to any designated use or that impairs the aesthetic value of the waterbody:

- A. Deposits
- B. Color
- C. Oil films
- D. Floating solids
- E. Foams
- F. Settleable solids
- G. Suspending solids
- H. Turbidity

- I. Floating debris or other materials as a result of human activity in amounts sufficient enough to be unsightly or cause degradation.
- II. Dissolved Solids: The addition of any dissolved solids shall not exceed concentrations which are or may become injurious to any designated use. Point sources containing dissolved solids shall obtain any and all applicable permits. At no instance shall total dissolved solids in the waters of the Reservation exceed a concentration of 500 mg/L as a monthly average nor more than 750 mg/L at any time as a result of controllable point sources. Waters connecting to Keweenaw Bay and waters designated as a public water supply source shall not exceed 50 mg/L of chlorides as a monthly average.
- III. Organoleptic Substances: The waters of the Reservation shall contain no taste-producing or odor producing substances in concentrations which impair or may impair their use for a public or agricultural water supply source, as recreational water or impair the palatability of fish as measured by test procedures approved by EPA.
- IV. Hydrogen Ion Concentration: The hydrogen ion concentration expressed as pH shall be maintained within the range of 6.5 to 9.0 in all waters of the Reservation. Any artificially induced variation in the natural pH shall remain within this range and shall not exceed 0.5 units of pH. The pH is not permitted to fluctuate in excess of 1.0 pH unit over a 24-hour period for other than natural causes.
- V. Nutrients: Reservation waters shall be free from nutrients (e.g. nitrogen and phosphorus) entering the waters as a result of human activity in concentrations that create nuisance growth of macrophytes, fungi, bacteria and algae.
- VI. Dissolved Oxygen: For all waterbodies capable of supporting aquatic life, the dissolved oxygen standard will be a daily minimum of 5 mg/L.
- VII. Radioactive Substances: Concentrations of radioactive materials shall not exceed the background concentration caused by naturally occurring materials.
- VIII. Temperature: The natural daily and seasonal temperature fluctuations of the Reservation waters shall be preserved. In all waters of the Reservation, the point of the temperature measurement normally shall be in the surface 1 meter, however, where turbulence, sinking plumes, discharge inertia or other phenomena upset the natural thermal distribution patterns of receiving waters, temperature measurements shall be required to identify the spatial characteristics of the thermal profile. Reservation lakes shall not receive a heat load which would:
- a) Increase the temperature of the thermocline or hypolimnion or decrease the volume thereof.
 - b) Increase the temperature of the receiving waters at the edge of the mixing zone more than 3 degrees Fahrenheit above the existing natural water temperature.
- Reservation streams, rivers and impoundments naturally capable of supporting warmwater fish shall not receive a heat load which would warm the receiving water at the edge of the mixing zone more than 5 degrees Fahrenheit above the existing natural water temperature.
- Reservation streams, rivers and impoundments naturally capable of supporting coldwater fish shall not receive a heat load which would increase the temperature of the receiving waters at the edge of the mixing zone more than 2 degrees Fahrenheit.
- IX. Wild Rice Habitat: Any Reservation water which supports wild rice growth shall not exceed sulfate levels of 10 mg/L.
- X. Microorganisms: Reservation waters designated for primary recreational contact shall contain no more than 151 enterococci per 100 mL and no more than 130 Escherichia coli per 100 mL. Compliance

shall be based on monthly samples collected in the manner consistent with Standard Methods for the Examination of Water and Wastewater 20th ed.

XI. Toxic Substances: No release of any substance is permitted into Reservation waters which alone or in combination with other substances, or in combination with other components of discharges, or their breakdown products and/or metabolites, would be acutely or chronically toxic, carcinogenic, teratogenic, injurious, bioaccumulative, bioconcentrating, responsible for adverse physiological responses in human beings and/or aquatic organisms, or which interfere directly or indirectly with designated, existing, or other uses. This provision excludes a discharges associated with an appropriate control document.

Numerical Criteria

Numeric criterion shall apply to all Reservation waters in order to govern water management decisions, activities that affect Reservation waters, and to protect and enhance water quality. Listed in the table that follows are the Chemicals of Concern and their respective numeric criteria for the protection of aquatic life, human health and wildlife. Levels of toxic substances in the surface waters of the Reservation shall not exceed the lowest applicable aquatic life, human health or wildlife value where the applicability of a value is determined by the waters designated use. In the absence of an aquatic life, human health or wildlife value for a given substance, values shall be derived in accordance with the methodology described in 40 CFR 132, Final Water Quality Guidance for the Great Lakes Basin, as amended. Unless otherwise stated, all concentrations expressed in these criteria represent dissolved concentrations to better approximate the bioavailable fraction in the water column.

Toxic Pollutant Numerical Criteria (pp. 1-6, p. 1)

Pollutant	CASRN	Aquatic Life Chronic Toxicity (ug/L)	Aquatic Life Acute Toxicity (ug/L)	Organoleptic Effects (ug/L)	Human Health Criteria (ug/L) *	DWS MCL (ug/L)	Wildlife Chronic (ug/L)
Arsenic (III)	22569-72-8	148 (GLI)	340 (GLI)				
Acenaphthene	83-32-9	19	48	20			
Acetic Acid	64-19-7	360	3200				
Acetone	67-64-1	1700	15000				
Acrylonitrile	107-13-1	37	330				
Alachlor	15972-60-8	11	150			2	
Atrazine	1912-24-9	7.3	50			3	
Barium	7440-39-3	190	1200			2000	
Benzene (c)	71-43-2	200	890		11 a 220 b	5	
Beryllium*	7440-41-7	App. A	App. A			4	
alpha-BHC	319-84-6				3.3 E-3 a 3.5 E-3 b		
beta- BHC	319-85-7				8.8 E-3 a 9.2 E-3 b		
total BHCs (Hexachlorocyclohexanes)	608-73-1				8.8 E-3 a 9.2 E-3 b		
Boron	7440-42-8	1400	12000				
Bromine	7726-95-6	0.27	2.4				
Bromomethane	74-83-9	35	320				
Butylamine	109-73-9	57	510				
Cadmium	7440-43-9	App. A	App. A			5	
Chlordane (c)	57-74-9	0.029	0.27		1.6 E-7 a, 1.6 E-4 b		
Chlorine	7782-50-5	3.9	19				
Chlorobenzene	108-90-7	47	420		450 a 2200 b	100	
Chloroform	67-66-3	170	1300				
6-Chloropicolinic acid	4684-94-0	26	230				
2-Chlorophenol	95-57-8	22	200	0.1			
4-Chlorophenol	106-48-9	15	140	0.1			
Chromium (III)	16065-83-1	App. A	App. A				
Chromium (VI)	18540-29-9	11 (GLI)	16 (GLI)	32			
Cobalt	7440-48-4	100	370				
Copper	7440-50-8	App. A	App. A	1000		1300	
Cyanazine	21725-46-2	110	1000				
Cyanide (as free CN ⁻)	57-12-5	5.2 (GLI)	22 (GLI)	44		200	
Cyanides	n/a				600 a 3600 b		
2,4-D (2,4- Diphenyldioxyacetic acid)	94-75-7	220	1400			70	
DDD (c)	72-54-8				6.4 E-4 a, b		
DDE (c)	72-55-9				2.3 E-4 a, b		
DDT (c)	50-29-3	0.0032 (GLI)	0.029 (GLI)		1.0 E-4 a, b		
DDT and metabolites (c)	n/a						1.1E-5
1,2-Dichlorobenzene	95-50-1	16	140			600	
1,3-Dichlorobenzene	541-73-1	38	210				
1,4-Dichlorobenzene	106-46-7	13	80			75	
3,3'-Dichlorobenzidine	91-94-1						

		4.5	41				
1,2-Dichloroethane	107-06-2	1000	7700			5	
1,1-Dichloroethylene	75-35-4	65	1200			7	
1,2-Dichloropropane	78-87-5	360	3200			5	

Table 1. Toxic Pollutant Numerical Criteria (pp. 1-6, p. 2)

Pollutant	CASRN	Aquatic Life Chronic Toxicity (ug/L)	Aquatic Life Acute Toxicity (ug/L)	Organoleptic Effects (ug/L)	Human Health Criteria (ug/L)*	DWS MCL (ug/L)	Wildlife Chronic (ug/L)
2,4-Dichlorophenol	120-83-2	19	160	0.3			
Dieldrin (c)	60-57-1	0.056 *(GLI)	0.24 *(GLI)		4.6 E-6 a , b		
Diethylamine	109-89-7	20	180				
Di-n-butyl phthalate	84-74-2	9.7	38				
2,4-Dimethylphenol	105-67-9	12	80	400	440 a 5900 b		
Dimethylsulfoxide	67-68-5	1.9E5	1.7E6				
2,4-Dinitrophenol	51-28-5	12	110		55 a 2000 b		
1,4-Dioxane	123-91-1	2.2E 4	2.0E 5				
bis-chloromethyl Ether	542-88-1						
Endrin	72-20-8	0.036 *(GLI)	0.086 *(GLI)	0.17 *		2	
N-ethylaniline	103-69-5	1.8	16				
Ethylbenzene	100-41-4	18	160			700	
bis (2-ethylhexyl) phthalate	117-81-7	0	285				
Fluoranthene	206-44-0	1.6	14				
Fluorene	86-73-7	12	110				
Formaldehyde (c)	50-00-0	120	1000				
Heptachlor	76-44-8				6.7E-4 a 6.8 E-4 b	0.4	
Hexachlorobenzene (c)	118-74-1				3.0 E-4 a , b	1	
Hexachlorobutadiene (c)	87-68-3				0.12 a , b		
Hexachloroethane	67-72-1	8	70		3.8 a 4.4 b		
Hydrogen peroxide	7722-84-1	10	92				
Hydrogen sulfide	7783-06-4	0.088	0.8				
Lead	7439-92-1	App. A	App. A			15	
Lindane (gamma-BHC))	58-89-9		0.95 *(GLI)		0.29 a 0.30 b	0.2	
Lithium	7439-93-2	25	155				
Manganese	7439-96-5	140	1200				
Mercury (II)	n/a	0.77	1.4			2	
Mercury (including methylmercury)	22967-92-6				1.4 E-3 a , b		1.3 E-3
Methylene Chloride (Dichloromethane) (c)	75-09-2	940	8500		47 a 2000 b	5	
Mirex	2385-85-5				4.4 E-4 a , b		
Molybdenum	7439-98-7	800	7200				
Naphthalene	91-20-3	13	100				
Nickel	7440-02-0	App. A	App. A				
4-Nitrophenol	100-02-7	60	540				
N,N-dimethylacetamide	127-19-5	4100	37000				
Nonylphenol	25154-52-3	1.8	6.8				
o-cresol	95-48-7	82	740				

Octylphenol	140-66-9	2	13				
Parathion	56-38-2	0.013 *(GLI)	0.065 *(GLI)				
PCBs (as a class) (c)	27323-18-8				1.8 E -5 a , b	0.5	7.4E-5
Pentachlorobenzene	608-93-5				0.12 a , b		
Pentachlorophenol	87-86-5	App. A	App. A	30		1	
Phenanthrene	85-01-8	2.4	21				
Phenol	108-95-2	210	1600	300			
Propylene oxide	75-56-9	220	2000				

Table 1. Toxic Pollutant Numerical Criteria (pp. 1-6, p. 3)

CASRN	(ug/L)	Aquatic Life Chronic Toxicity (ug/L)	Aquatic Life Acute Toxicity (ug/L)	Organoleptic Effects (ug/L)*	Human Health Criteria (ug/L)	DWS MCL (ug/L)	Wildlife Chronic Pollutant
Selenium	7782-49-2	4.6(GLI)	17.8(GLI)			50	
Silver	7440-22-4	0.54	0.057				
Strontium	7440-24-6	760	6900				
Styrene	100-42-5	160	1400			100	
2,3,7,8-TCDD (dioxin)	1746-01-6				5.7 E-9 a 5.8 E-9 b	3 E -5	3.1E-9
1,2,4,5-Tetrachlorobenzene	95-94-3				0.24 a , b		
1,1,2,2-Tetrachloroethane	79-34-5	380	910				
Tetrachloroethylene	127-18-4	45	360			5	
Tetrachloromethane	56-23-5	150	1300				
Thallium	7440-28-0	10	78			2	
1,2,4-Trichlorobenzene	120-82-1	30	100			70	
1,1,1 Trichloroethane	71-55-6	200	1800			200	
1,1,2-Trichloroethane	79-00-5	500	2800			5	
Trichloroethylene	71-55-6	1800	200		28 a 250 b	5	
2,4,8-Trichlorophenol	88-06-2	4.4	40	2			
Triethylamine	121-44-8	260	1100				
Toluene	108-88-3	140	840		4800 a 3.1 E4 b	1000	
Toxaphene	8001-35-2	0.005	0.15		4.4 E-5 a , b	3	
Vanadium	7440-62-2	12	110				
Xylene	1330-20-7	35	310			10000	
Zinc	7440-66-6	App. A	App. A	5000			

TABLE KEY

- * concentration expressed as total concentration
- a human health criteria for surface water with the designated use as a public drinking water source
- b human health criteria for surface water with the designated use as primary contact recreation
- (c) carcinogen
- (class) Includes all 209 congeners of PCBs

App. A Refer to Appendix A, § I.A.2-3 for these values

BHC common name for hexachlorocyclohexanes

CASRN Chemical Abstracts System Reference Number

DWS National Primary Drinking Water Standards

E exponent, for example E-2 = 10^{-2}

(GLI) Criterion adopted directly from 40 CFR 132.6, Final Water Quality Guidance for the Great Lakes System

MFL million fibers per liter

MCL Maximum Contaminant Level

(PAH) Polycyclic Aromatic Hydrocarbon

TABLE DEFINITIONS

Acute Toxicity	The level of a toxicant, whole effluent or mixture in the ambient water column to which an aquatic community can be exposed briefly without resulting in unacceptable effects. It is equivalent to one half of the final acute value. The averaging period of 1 hour will be used for acute toxicity values.
Chronic Toxicity	The lowest concentration of a toxicant, whole effluent, or mixture that does not cause injurious or debilitating effects in an aquatic organism resulting from repeated long-term exposure to a substance relative to the organism's lifespan.
Organoleptic Effects	Non-toxicity based criteria for taste and odor, which make water and edible aquatic life unpalatable but not toxic to humans.

6

Antidegradation Policy, Variances and Mixing Zones

Antidegradation Policy

This antidegradation policy shall be applicable to any action or activity by any source, point or nonpoint, that is anticipated to result into new or increased loading of pollutants to surface waters of the Keweenaw Bay Indian Community, for which independent regulatory authority exists requiring compliance with water quality standards. Pursuant to these standards, for all waters of the Keweenaw Bay Indian Community, the level of water quality necessary to protect existing uses shall be maintained and protected. Where designated uses of the waterbody are not attained, there shall be no lowering of the water quality with respect to the pollutant or pollutants that are causing the nonattainment. In those cases where a lowering of water quality is associated with a thermal discharge, the decision to allow such degradation shall be consistent with section 316 of the Clean Water Act.

Implementation Procedures

I. Definitions

Bioaccumulative Chemical of Concern (BCC): A chemical which upon entering the surface water, by itself or as its toxic transformation product, accumulates in aquatic organisms. Generally, chemicals with a half-life in the water of less than eight weeks are not BCCs. BCCs listed in 40 CFR 132, table 6.A (pg. 15393), as amended, will comprise the definition of all the chemicals identified herein as BCCs.

Control Document: Any authorization issued by the permitting authority to any source of pollutants to waters under its jurisdiction that specifies conditions under which the source is allowed to operate.

Outstanding National Resource Waters (ONRW): Waters designated in Chapter 8 of this document as Outstanding National Resource Waters shall be consistent with "zero discharge" provisions of the Clean Water Act (PL 92-500, 1972 Amendments). This Ordinance requires that no new or increased discharges will be allowed that enter or effect ONRW's. Absolutely no new discharge water shall enter or affect ONRW designated waters of Reservation. ONRW's shall be guaranteed a unique and high level of protection.

Outstanding Keweenaw Bay Indian Community Resource Waters (OKRW) Waters may be designated as an Outstanding Keweenaw Bay Indian Community Resource Water (OKNW) because of exceptional cultural, aesthetic, recreational or ecological significance. Upon approval of this Ordinance, all waters of the Reservation not designated ONRWs shall be designated as Outstanding Keweenaw Bay Indian Community Resource Waters (OKRW) and shall be maintained and protected as such. For waters designated as OKRWs, all new discharges of any bioaccumulative chemical of concern (BCC) shall be prohibited. New or increases in existing discharges, including those that do not contain any bioaccumulative chemical of concern, shall be subject to all applicable provisions of the antidegradation policy.

II. Guidelines

A. Exclusion from an Antidegradation Review: Changes in loadings of any Chemical of Concern within the existing capacity and processes, and that are covered by the existing applicable control document, are not subject to an antidegradation review. These changes include, but are not limited to: a) Normal operational variability; b) Changes in intake water pollutants; c) Increasing the production hours of the facility, (e.g., adding a second shift); or d) Increasing the rate of production. Also, excluded from an antidegradation review are new effluent limits based on improved monitoring data or new water quality criteria or values that are not a result of changes in pollutant loading.

B. For all waters, the Community and permitting authority shall ensure that the level of water quality necessary to protect existing uses is maintained. In order to achieve this, controls shall be established as necessary on point and nonpoint sources of pollutants to ensure that the criteria applicable to the designated use are achieved in the water and that any designated use of a downstream water is protected. Where water quality does not support the designated uses of a waterbody or ambient pollutant concentrations exceed water quality criteria applicable to that waterbody, the Community and the permitting authority shall not allow a lowering of water quality for the pollutant or pollutants preventing the attainment of such uses or exceeding such criteria.

C. Outstanding National Resource Waters: Waters designated as ONRWs within these regulations will not be subject to any lowering of water quality for economic or social development purposes. Persons currently engaging in discharges or loadings that enter or affect ONRW designated waters of the Reservation shall obtain a Section 401 Certification, if applicable, and the requisite control documents. No new or increased discharges shall be allowed to ONRW designated waters of the Reservation. Temporary (i.e. weeks or months) lowering of water quality may be permitted, as determined on a case by case basis.

D. Outstanding Keweenaw Bay Indian Community Waters (OKRW): For waters designated as OKRW, all new discharges of any BCC will be prohibited. For new or expanded discharges which do not contain any BCCs, the permitting authority may choose to allow a lowering of water quality if, after appropriate public notice, pursuant to 40 CFR 132- Final Water Quality Guidance for the Great Lakes System, and fulfilling the intergovernmental coordination requirements and after due consideration of such technical, economic, social and other criteria in the area in which the water is located, it is demonstrated that there are no feasible and prudent alternatives to a lowering of water quality and the lower water quality is necessary to accommodate important social and economic development. In addition, when allowing a lowering of water quality, the Community and permitting authority shall ensure, through the application of appropriate controls on point and nonpoint pollutant sources, that water quality necessary to protect the associated designated uses is maintained and protected.

Any entity proposing new or increased discharges or loadings that will affect OKRW designated waters of the Reservation shall obtain the requisite control documents. In no case shall any new or increased discharges or loadings be allowed if they interfere with or become injurious to existing and designated uses or they would result in the violation of any applicable narrative or numeric criteria.

III. Antidegradation Demonstration

Any entity seeking to lower water quality of any waterbody of the Reservation or seeking an increase in a discharge of any Chemical of Concern must first submit an antidegradation demonstration for consideration by the Community and the appropriate regulatory authority. The antidegradation demonstration shall include, but may not be limited, to the following:

1. Pollution Prevention Alternative Analysis. Identify any pollution prevention alternatives and techniques that are available to eliminate or significantly reduce the extent to which the increased loading results in a lowering of water quality.
2. Alternative or Enhanced Treatment Analysis. Identify alternative or enhanced treatment techniques that are available that would eliminate the lowering of water quality and their costs relative to the cost of treatment necessary to achieve the applicable effluent limitations.

3. Social and Economic Analysis. Identify the social and economic development benefits to the area in which the waters are located that will be foregone if the lowering of water quality is not allowed.

IV. Antidegradation Decision

If the permitting authority determines that the antidegradation demonstration shows that lowering water quality is necessary to support important social and economic development in the area, then the permitting authority may authorize all or part of the proposed lowering to occur through the establishment of conditions in the control document. Prior to the issuance of a decision, the permitting authority shall publish a notice in a local newspaper and provide a minimum forty-five consecutive day comment period. During this comment period, any tribal member or other interested persons may request a public hearing of such changes or revisions by the permitting authority. The decision to hold a public hearing shall be made in accordance with 40 CFR 25. Upon approval of a public hearing request, the permitting authority shall by public notice in a local newspaper announce the date, time and location of such public hearing and this said public notice shall be published at least forty-five consecutive days prior to the public hearing. Any reports, documents and data relevant to the discussion at the public hearing shall be made available at least thirty days before the hearing at the expense of the permitting authority.

Variances

A variance is a temporary exemption from any water quality standard in situations where the ambient water quality conditions do not meet the water quality standards established herein. No variances will be granted by the Keweenaw Bay Indian Community from any water quality standard as they apply to Reservation waters.

Mixing Zones

I. General Guidelines

A mixing zone is a zone of initial dilution within the immediate area of a point source discharge. The permitting authority may allow for mixing zones, however, the Community retains the right to object to, question and challenge a mixing zone on a parameter by parameter basis. The Keweenaw Bay Indian Community retains the right to determine and insist upon a more restrictive volume or area for mixing zones in cases where it is determined to be necessary. Where a mixing zone is determined to be unnecessary for a discharger to meet compliance with the water quality standards of the Keweenaw Bay Indian Community, a mixing zone will not be allowed.

Exposure in mixing zones shall not cause an irreversible response that results in deleterious effects to populations of aquatic life or wildlife. The mixing zone shall not prevent the passage of fish or fish food organisms in a manner that would result in adverse impacts on their immediate or future populations. Mixing zones must not jeopardize the continued existence of any endangered or threatened species listed under Section 4 of the Endangered Species Act, United States Code, Title 16, Section 1533, or result in the destruction or adverse modification of such species' critical habitat.

As a minimum restriction, WLAs and LAs established in a TMDL, WLAs in the absence of a TMDL and preliminary WLAs for the purposes of determining the need for a WQBELs for the protection of aquatic life, wildlife and human health from chronic effects shall be calculated assuming a dilution fraction no greater than 25 percent of the stream design flow in flowing waters and a dilution no greater than one part effluent to 10 parts receiving water in nonflowing waters. For effluents consisting of chemical mixtures, Toxicity Equivalency Factors and Bioaccumulation Equivalency Factors shall be determined in a manner consistent with 40 CFR 132, Appendix F, Procedure 4.

II. Mixing Zones: Bioaccumulative and Non-bioaccumulative Chemicals of Concern

There shall be no mixing zones available for new discharges of Bioaccumulative Chemicals of Concern, as defined by 40 CFR 132.6, Table 6.A, as amended, to the waters of the Reservation effective upon the adoption of this ordinance. New discharges shall be defined as 1) a discharge of pollutants to the waters of the Reservation from a building, structure, facility or installation, the construction of which commences after the date this ordinance takes effect or 2) an expanded discharge from an existing discharger that commences after the date this ordinance takes effect. Exempt from this definition are expanded discharges resulting from changes in loadings of any BCC within the existing capacity and processes (e.g., normal operational variability, changes in intake water pollutants, increases in the production hours of the facility, the adding of additional shifts, or increases in the rate of production.) All other discharges of BCCs shall be defined as existing discharges.

Mixing zones for existing discharges of BCCs to the waters of the Reservation will be allowed, however, they are subject to review and modification.

Mixing zones for discharges of non-bioaccumulative chemicals of concern, as defined by 40 CFR 132.6, Table 6.A, as amended, to the waters of the Reservation will be allowed on a case by case basis, however, they are subject to the applicable provisions within the Antidegradation Policy and all applicable guidelines found within 40 CFR 132, Final Water Quality Guidance for the Great Lakes System.

Appendix A: Methodologies for the Development of Aquatic Life, Human Health and Wildlife Criteria and Values

I. General Methodology

For Chemical of Concern as listed in 40 CFR 132, Final Water Quality Guidance for the Great Lakes System §132.6, Table 6, the associated methodology for calculating numeric criteria were adopted herein. For substances that are known carcinogens, only the more stringent cancer values are listed for human health criteria in Chapter 5 of these regulations. For a complete description as to how these criteria values were derived, refer to Appendixes A-C in 40 CFR 132 and Appendix B in this document.

For substances that were identified as Chemical of Concern within 40 CFR 132 but with no CCC and CMC values listed therein, aquatic life numeric criteria was adopted from the state of Michigan's water quality standards (see Appendix B for supporting documents). For chemicals of concern with CCC, CMC and CF values published in 40 CFR 132, Final Water Quality Guidance for the Great Lakes System, aquatic life numeric criteria were derived from those said values. These said criteria are denoted in Chapter 5 as (GLI).

The numerical criteria for organoleptic effects were adopted from the National Recommended Water Quality Criteria, EPA document 822-Z-99-001. The numerical criteria for drinking water standards were adopted from the National Primary and Secondary Drinking Water Regulations. All wildlife numeric criteria were adopted from 40 CFR 132, Final Water Quality Guidance for the Great Lakes System.

II. Hardness and pH dependent Aquatic Life Criteria and Values.

Aquatic life criteria that vary with total hardness or pH are listed in this subsection. Sample standards, associated with a given hardness or pH, are presented herein.

Total hardness is the sum of the calcium and magnesium concentrations expressed as calcium carbonate in mg/L. pH is the negative logarithm of the hydrogen ion activity concentrations expressed as moles per liter, the mathematical expression being: $\text{pH} = -\log \{H^+\}$. According the 40 CFR 132 guidelines, ambient or effluent waters with total hardness values greater than 400mg CaCO_3/L , 400mg CaCO_3/L is to be used in the calculation of the standard.

1. Key to Terms:

**	Total concentration
AC_{aq}	Aquatic Life Acute Toxicity Criterion, dissolved concentration
AC^{d}	Acute Toxicity Criterion, dissolved concentration
AC^{tr}	Acute Toxicity Criterion, total recoverable

CC _{aq}	$CC^{tr} = \exp \{1.273 * [\ln(hd)] + -3.296\}$	5.4	9.0	13	22	32
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Nickel

total dissolved

formula; results in ug/L

Example criteria for hd of:

AC_{aq}

$AC^{tr} = \exp \{0.846 * [\ln(hd)] + 2.255\}$

50 75 100 150 200

$AC_{aq} = AC^{tr} * 0.998$

261 367.8 469.2 661.2 843.3

261 367 468 660 842

CC_{aq}

$CC^{tr} = \exp \{0.846 * [\ln(hd)] + 0.0584\}$

29.02 40.9 52.2 73.5 93.8

$CC_{aq} = CC^{tr} * 0.997$

29 41 52 73 94

Zinc

total dissolved

formula; results in ug/L

Example criteria for hd of:

AC_{aq}

$AC^{tr} = \exp \{0.8473 * [\ln(hd)] + 0.884\}$

50 75 100 150 200

$AC_{aq} = AC^{tr} * 0.978$

66.7 93.9 119.8 168.9 215.6

65 92 117 165 211

CC_{aq}

Identical to the Acute Toxicity Criteria

Therefore, $AC_{aq} = CC_{aq}$ and $AC^{tr} = CC^{tr}$

3. pH Dependent Criteria

Pentachlorophenol

total concentration

formula; results in ug/L

Example criteria for hd of:

AC^t

$AC^t = \exp \{1.005 \{[pH] + -4.869\}\}$

6.5 7.0 7.5 8.0 8.5

5.2 8.5 14 23 38

CC^t

$CC^t = \exp \{1.005 \{[pH] + -5.134\}\}$

4.0 6.5 11 18 29

III. Methodology for Development of Human Health Criteria and Values

A. Data Sources

1. For substances listed in 40 CFR §132.6, Table 6, Human Health Criteria was derived according to the

methodology described in Appendix B and C of 40 CFR 132. BCF, BAF and K_{ow} values were obtained from one of the following sources:

a. Great Lakes Water Quality Initiative Technical Support Document for the Procedure to Determine Bioaccumulation Factors, EPA-820-B-95-005.

b. The EPA Ambient Water Quality Criteria documents issued after January 1, 1980.

c. ECOTOX database available at the USEPA web site <http://www.epa.gov/ecotox/>.

2. ADE and RAD values were obtained from the U.S. Environmental Protection Agency's IRIS database.

3. The fraction dissolved in water was calculated using the DOC and POC if provided in the study from which the field measured BAF or laboratory BCF were obtained. If no POC or DOC are reported in the study the fraction dissolved in water was presumed to be 1 if the $\log K_{ow}$ is 4 or less.

B. Assumptions

Within 40 CFR 132 guideline, several key assumptions are used for the derivation of numerical criteria. They are:

1. Assume an average body weight of 70 kg.
2. Assume an average water consumption of 2L/day. Incidental water consumption associated with recreation activities of 0.01L/day.
3. Assume an average fish consumption rate of 15 g/day. This average is based on an assumed 3.6g/day consumption of fish from trophic level 3 and 11.4 g/day of fish from trophic level 4.

Within this document, the first two assumption relative to body weight and water consumption were adopted into the calculations of Human Health Criteria. However, the assumption of fish consumption was deemed inadequate for the protection of health on the Reservation. According to a study prepared for the Agency for Toxic Substances and Disease Registry by John A. Dellinger, Ph.D., the average fish consumption for a study group of six Ojibwa Reservations in the Upper Great Lakes (which included Keweenaw Bay Indian Community) was 23.58g/day (Dellinger, 1998). This average is based on consumption averages of 8.11 g/day of fish from trophic level 3 and 15.47 g/day of fish from trophic level four. These values were used in all calculations of Human Health Criteria, except where noted otherwise.

The following is the calculation used to derive the fish consumption rate for the Keweenaw Bay Indian Community. The values used herein were obtained from the "Ojibwa Health Study, Phase II", prepared for the Agency for Toxic Substances and Disease Registry by Dr. John A. Dellinger (Dellinger, 1998).

Average Daily Fish consumption:	23.58 g/day
Annual Consumption of trophic level 3 (TL3):	1912 g/yr
Annual Consumption of trophic level 4 (TL4):	3644 g/yr
Total annual fish consumption (TL3, TL4):	5556 g/yr
Percent TL3 consumed $[\text{TL3}/(\text{TL3}+\text{TL4})]*100$:	34.41%
Percent TL4 consumed $[\text{TL4}/(\text{TL3}+\text{TL4})]*100$:	65.59%
g/day TL3 consumed $\{\% \text{TL3} * 23.58 \text{g/day}\}$:	8.114 g/day
g/day TL4 consumed $(\% \text{TL4} * 23.58 \text{g/day})$:	15.47 g/day

The following table includes all values for RfDs and Oral Slope values used in the calculation of human health criteria. These values were obtained from the IRIS database, <http://www.epa.gov/iris/>. Note that n/a refers to not applicable and (c) refers to carcinogen. - refers to not used as the substance is a carcinogen.

Table 1: IRIS Data

SUBSTANCE	CASRN	Rfd {(mg/kg)/day}	ORAL SLOPE VALUE
Chlorobenzene	108-90-7	2.0E-2	n/a
2,4-Dimethylphenol	105-67-9	2.0E-2	n/a
2,4-Dinitrophenol	51-28-5	2.0E-3	n/a

SUBSTANCE	CASRN	Rfd {(mg/kg/day)}	ORAL SLOPE VALUE
Lindane	58-89-9	3.0E-4	n/a
Hexachlorobutadiene (c)	87-68-3	-	7.8E-2
Hexachlorocyclohexanes (c)	608-73-1	-	1.8
alpha-BHC (c)	319-84-6	-	6.3
beta-BHC (c)	319-85-7	-	1.8
Mirex	2385-85-5	2.0E-4	n/a
Pentachlorobenzene	608-93-5	8.0E-4	n/a
1,2,3,5-Tetrachlorobenzene	95-94-3	3.0E-4	n/a
Heptachlor (c)	76-44-8	-	4.5

The following table contains the BAFs used by the environmental staff of the Reservation to derive human health criteria. These BAFs were obtained from the Great Lakes Water Quality Initiative Technical Support Document for Procedures to Determine Bioaccumulation Factors, EPA 820-B-95-005.

SUBSTANCE	CASRN	BAF _{TL3}	BAF _{TL4}
Benzene	71-43-2	3	5
Chlorodane	57-74-9	116600	154200
Chlorobenzene	108-90-7	15	24
DDD	72-54-8	97680	243300
DDE	72-55-9	532800	2903000
DDT	50-29-3	376400	1114000
Dieldrin	60-57-1	72610	571000
2,4-Dimethylphenol	105-67-9	5	7
2,4-Dinitrophenol	51-28-5	2	2
Hexachlorobenzene	118-74-1	43690	71080
Hexachlorocyclohexane (total)	608-73-1	1412	2000
Alpha-BHC	319-84-6	1035	1517
Beta-BHC	319-85-7	1411	1999
Hexachloroethane	67-72-1	371	532
Lindane	58-89-9	1926	2636
Methylene Chloride	75-09-2	1	2
Mirex	2385-85-5	353400	1461000
PCBs (class)		321000	1086000

Table 2: Non-Derived BAF_{TL3} and BAF_{TL4} continued

SUBSTANCE	CASRN	BAF _{TL3}	BAF _{TL4}
Pentachlorobenzene	608-93-5	8248	19420
2,3,7,8 TCDD		48490	79420
1,2,3,5 Tetrachlorobenzene	95-94-3	1467	3610
Toluene	108-88-3	11	17
Toxaphene	8001-35-2	498100	665600
Trichloroethylene	71-55-6	7	12

The following table contains baseline BAFs which were calculated by the staff of the Natural Resources Department. These baseline BAFs were derived from either field BAFs, BSAFs, laboratory BCFs, or predicted from K_{ow}'s. The means by which the baseline BAF was derived is indicated by the symbol _{TL3}. The baseline BAFs values were used to calculate human health criteria for the associated substances listed. The human health criteria were calculated according the guidelines found within Appendixes A-C in 40 CFR 132.

Table 3: Derived baseline BAFs

Source Data For Derived Baseline BAF					
SUBSTANCE	Baseline BAF _{TL3} / BAF _{TL4}	Field BAF	BSAF	Laboratory BCF	log K _{ow}
Heptachlor	BAF _{TL3} 426455.1053 BAF _{TL4} 360837.0131			9500 _a	5.05 _b

Footnotes:

a This value obtained from EPA Ambient Water Quality Criteria documents issued after January 1, 1980.

b This value obtained from the National Institute of Health National Toxicity program website.

<http://ntp-server.niehs.nih.gov>.

Calculation of Human Health Criteria for Heptachlor

Givens:

species: fathead minnow

lipid content: 7.6%

measured BCF: 9500

log Kow: 5.05

FCM 3: 3.412 note source below

FCM4 2.887

f_{fd test} 1 (assumed as test DOC and POC not given; laboratory study, therefore assume test water with little organic carbon)

f_{fd site} = $1 / [1 + (\text{doc})(K_{ow})/10 + (\text{POC} \cdot K_{ow})] = 1 / [1 + (10E5.05 \cdot 2E-6)/10 + (4E-8 \cdot 10E5.05)] = 0.97378$

From 40 CFR 132, Table B1:

FCM	log Kow	FCM
FCM3	5.0	3.181
FCM3	5.1	3.643
FCM4	5.0	2.612
FCM4	5.1	3.162

therefore, for log Kow of 5.05: $(3.643 - 3.181)/2 = 0.231$

FCM3 for log Kow 5.05 = $3.181 + 0.231 = 3.412$

therefore, for log Kow of 5.05 $(3.162 - 2.612)/2 = 0.275$

FCM4 for log Kow 5.05 = $2.612 + 0.275 = 2.887$

Calculation Baseline BAF:

$$\begin{aligned}\text{Baseline BAF}_{\text{TL3}} &= \text{FCM3} [\text{BCF}/f_{\text{fd}} - 1] [1/f_l] \\ &= 426455.1053\end{aligned}$$

$$\begin{aligned}\text{Baseline BAF}_{\text{TL4}} &= \text{FCM4} [\text{BCF}/f_{\text{fd}} - 1] [1/f_l] \\ &= 360837.013157895\end{aligned}$$

Calculation Final BAF:

$$\text{HH BAF}_{\text{TL3}} = [(\text{baseline BAF}_{\text{TL3}} * 0.0182) + 1](\text{site } f_{\text{fd}})$$

$$\begin{aligned}\text{HH BAF}_{\text{TL3}} &= [426455.1053 (0.0182) + 1] (.97378) \\ &= 7558.95\end{aligned}$$

$$\text{HH BAF}_{\text{TL4}} = [(\text{baseline BAF}_{\text{TL4}} * 0.0310) + 1](\text{site } f_{\text{fd}})$$

$$\begin{aligned}\text{HH BAF}_{\text{TL4}} &= [360837.013157895(0.0310) + 1](0.97378) \\ &= 10893.6\end{aligned}$$